

### REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1-20 are currently pending in this application. No claim amendments accompany this Response. Accordingly, no new matter has been added.

In view of the remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

#### Issues Under 35 U.S.C. § 103(a)

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lyons (U.S. 6,825,060) (hereinafter Lyons '060) in view of Awano (U.S. 7,084,507) (hereinafter Awano '507). Applicants respectfully traverse.

The Examiner asserts that Lyons '060 teaches a terminal for organic material including first and second electrodes, and an organic layer having a 6-membered carbon ring. The Examiner acknowledges that Lyons '060 does not disclose a terminal wherein the organic material and the metal do not directly contact each other, but relies on the teachings of Awano '507 to overcome this deficiency.

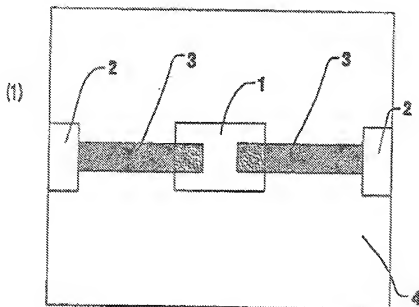
Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the invention. A patent composed of several elements is not proved obvious merely by

demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v Teleflex Inc.*, No. 04-1350, slip op. at 11 (U.S. April 30, 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Furthermore, there must be a reasonable expectation of success in making the invention. *In re Vaack*. Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l Co. v Teleflex Inc.*.

The present invention is directed to a terminal for an organic material comprising a carbon nanotube in contact with an organic material having a 6-membered carbon ring, and a metal that is in contact with a part of the carbon nanotube, wherein the organic material and the metal do not directly contact each other.

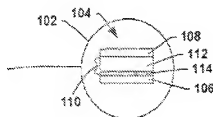
For purposes of illustration and not limitation, the Examiner's attention is directed to Applicants' Figure 1, reproduced below:

F i g . 1



As shown in Fig. 1, the carbon nanotube (3) is in direct contact with a metal (2) and an organic material having a 6-membered carbon ring (1). Evidently, the metal (2) is not in contact with the organic material (1).

Lyons '060 teaches a method of making organic memory cells made of two electrodes with a controllably conductive media between the electrodes. The controllably conductive media contains an organic semiconductor layer that contains a photosensitive compound. The elements of the organic memory cells of Lyons '060 are shown in Figure 1 of this reference, reproduced below:



In the Figure above, 106 represents the first electrode (metal), 108 represents the second electrode (metal), 112 represents the organic semiconductor layer and 114 represents a passive layer.

Lyons '060 teaches that the organic semiconductor layer (112) contains an organic semiconductor material, including a variety of organic structures that can have 6-membered carbon rings, such as a carbon nanotube. The passive layer (114) is described at column 16, line 66 to column 17, line 27 as follows:

*A passive layer contains at least one conductivity facilitating compound that contributes to the controllably conductive properties of the controllably conductive media. The conductivity facilitating compound has the ability to donate and accept charges (holes and/or electrons). The passive layer thus may transport between an electrode and the organic polymer layer/passive layer interface, facilitate charge/carrier injection into the organic polymer layer, and/or increase the concentration of a charge carrier in the organic polymer layer. In some instances, the passive layer may store opposite charges thereby providing a balance of charges in the organic memory device as a whole. Storing*

*charges/charge carriers is facilitated by the existence of two relatively stable oxidation states for the conductivity facilitating compound.*

*Generally, the conductivity facilitating compound or an atom in the conductivity facilitating compound has at least two relatively stable oxidation states. The two relatively stable oxidation states permit the conductivity facilitating compound to donate and accept charges and electrically interact with the organic semiconductor layer. The particular conductivity facilitating compound employed in a given organic memory cell is selected so that the two relatively stable oxidation states match with the two relatively stable oxidation states of the organic semiconductor material. Matching the energy bands of two relatively stable oxidation states of the organic semiconductor material and the conductivity facilitating compound facilitate charge carrier retention in the organic semiconductor layer.*

Further at column 17, line 64 to column 18, line 8, Lyons '060 teaches different compositions for use as the passive layer 114 as follows:

*Examples of conductivity facilitating compounds that may make up the passive layer include one or more of copper sulfide ( $\text{Cu}_2\text{S}$ ,  $\text{CuS}$ ), copper rich copper sulfide ( $\text{Cu}_3\text{S}/\text{Cu}_2\text{S}$ ,  $\text{Cu}_3\text{S}/\text{CuS}$ ), copper oxide ( $\text{CuO}$ ,  $\text{Cu}_2\text{O}$ ), manganese oxide ( $\text{MnO}_2$ ), titanium dioxide ( $\text{TiO}_2$ ), indium oxide ( $\text{I}_3\text{O}_4$ ), silver sulfide ( $\text{Ag}_7\text{S}$ ,  $\text{AgS}$ ), gold sulfide ( $\text{Au}_7\text{S}$ ,  $\text{AuS}$ ), iron oxide ( $\text{Fe}_3\text{O}_4$ ), nickel arsenide ( $\text{NiAs}$ ), cobalt*

*arsenide (CoAs<sub>2</sub>), and the like. The conductivity facilitating compounds do not dissociate into ions under the strength of the electric field. The passive layer may contain two or more sub-passive layers, each sub-layer containing the same. different, or multiple conductivity facilitating compounds.*

Based on the disclosures of Lyons '060 reproduced above, the teachings of Lyons '060 could be interpreted in two distinct ways, as discussed below. However, regardless of the interpretation of Lyons '060, the references of record fail to teach or suggest every aspect of the present invention.

One arguably possible interpretation of the teachings of Lyons '060 is that Lyons' organic semiconductor layer (112) is equivalent to the presently claimed carbon nanotube (3). In such case, Lyons '060 would fail to teach that the organic semiconductor layer (112) is in direct contact with an organic material having a 6-membered carbon ring, as required by the present invention, since the passive layer (114) of Lyons '060 is not described as possibly being made of an organic material having a 6-membered carbon ring. Awano '507 fails to cure these deficiencies. Awano '507 does not teach or suggest making a passive layer (such as Lyons' layer 114) out of an organic material having a 6-membered carbon ring, or directly contacting a carbon nanotube with said organic material having a 6-membered carbon ring. As such, the Examiner has failed to establish a *prima facie* case of obviousness, as required by 35 U.S.C. §103.

A second possible interpretation of the teachings of Lyons '060 is that the organic semiconductor layer (112) is equivalent to the instant organic material having a 6-membered carbon ring. In such case, however, the passive layer (114) of Lyons '060 must necessarily be a carbon nanotube to have the instantly claimed configuration, wherein a carbon nanotube is in

direct contact with a metal and an organic material having a 6-membered carbon ring, and the metal is not in contact with the organic material. However, as is clear from the disclosure of Lyons '060, passive layer (114) is not equivalent to Applicants' carbon nanotube. Specifically, a carbon nanotube does not have the required properties of Lyons' passive layer (114), such as:

*"...at least two relatively stable oxidation states. The two relatively stable oxidation states permit the conductivity facilitating compound to donate and accept charges and electrically interact with the organic semiconductor layer. The particular conductivity facilitating compound employed in a given organic memory cell is selected so that the two relatively stable oxidation states match with the two relatively stable oxidation states of the organic semiconductor material."* (Lyons '060 at column 17, lines 15-23).

Evidently, the cited references, alone or in combination, fail to teach or suggest every limitation of the instant invention. For this reason alone, this rejection should be withdrawn.

Furthermore, assuming *arguendo* that Awano '507 cured the deficiencies of Lyons '060, Applicants note that references cannot be arbitrarily combined. There must be some reason why one of ordinary skill in the art would be motivated to make the proposed combination of the primary and secondary references. *In re Nomiya*, 184 USPQ 607 (CCPA 1975). Courts have clearly established that, even when a combination of references teaches every element of a claimed invention, a rejection based on a *prima facie* case of obviousness is improper absent a motivation to combine. *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998).

Even assuming *arguendo* that Awano '507 teaches a carbon nanotube in contact with an organic material having a 6-membered carbon ring, it would not be obvious to modify the

passive layer (114) of Lyons '060 to include a carbon nanotube, since such a modification would render the device of Lyons '060 unfit for its intended purpose. Applicants respectfully submit that one of ordinary skill in the art would not be motivated to make the combination proposed by the Examiner absent impermissible hindsight gleaned from Applicants' disclosure.

Clearly, the present invention is not taught or suggested by the prior art of record. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

#### Miscellaneous

Applicants respectfully note that the Examiner has reaffirmed the withdrawal of claims 3-20 as being directed to a non-elected species, but has not addressed the arguments presented in this regard in the Response filed on October 30, 2006. The arguments are reproduced below for the Examiner's convenience.

The Examiner has withdrawn claims 3-20 from further consideration asserting that they relate to a non-elected species. Applicants respectfully disagree and request that the Examiner reconsider. Applicants point out that the inventive aspect of the elected invention relates to the subject matter of claim 1. Moreover, even though the language of other claims (for instance independent claims 3 and 4) may differ, each of these claims essentially requires a carbon nanotube in contact with an organic material having a six-membered carbon ring and a metal in contact with a part of the carbon nanotube. Accordingly, based upon this related subject matter, Applicants submit that the Examiner should expand the consideration of the claims to claims 1-20. Therefore, rejoinder in this regard is respectfully requested.



Conclusion


All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Marc S. Weiner, Reg. No. 32,181 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Dated: MAY 29 2007

Respectfully submitted,

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